International Isotopes Inc.

May 6, 2011

ATTN: Document-Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Submittal of Responses to Requests for Additional Information (RAI) TAC L32739.

To Whom it May Concern,

The following documents are provided as a response to the US Nuclear Regulatory Commission RAIs pertaining to the International Isotopes Fluorine Products Inc. December 30, 2009 application to license a depleted uranium hexafluoride de-conversion and fluorine extraction process facility.

(1) Official Responses to Seismic and Structural RAIs – Public Version
(2) Official Responses to Seismic and Structural RAIs – Security Related Information
(3) Drawing Package – Security Related Information

Please contact me by phone at 208 524-5300 or email at jjmiller@intisoid.com if you have any questions regarding this letter or require additional information.

Sincerely,

John J. Miller, CHP
Radiation Safety Officer

JJM-2011-32

Enclosure as Stated

cc: Dr. Matthew Bartlett
U.S. Nuclear Regulatory Commission
Mail Stop E2C40M
6003 Executive Blvd.
Rockville, MD 20852

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NMSS

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SS-1. *Background:*
The LA and ISA Summary include several typographical errors.

Issue:
Minor typographical errors were found in various sections of the LA and ISA Summary. These errors need to be corrected.

Request:
1. *Correct the ground acceleration from 0.03g to 0.05g in the sentence that states, "The Peak Horizontal Ground Acceleration for a 1,000 and 2,500 year return is 0.03g and 0.12g respectively (USGS, 2002)" on Page 1-43 of the LA.*
2. *Correct the temperatures listed in LA Table 1-6 on Page 1-39.*
3. *Correct the section reference in LA Section 3.2.1 (Page 3-4) which states, "A description of the IIFP Site is contained in ISA Summary, Section 2 and a summary description is in LA Chapter 1." Section 2 should be Section 1 instead.*
4. *Correct the section reference in LA Section 3.2.2 which states, "the ISA Summary (Section 3) provides a description of the IIFP Facility." Section 3 should be Section 2.*
5. *Correct the column labels on the total snowfall in ISA Summary Table 1-1 (Page 1-6) and verify that the values listed in the table are correct.*
6. *Correct the temperatures listed in ISA Summary Table 1-2 (Page 1-7).*
7. *Items 1-6 are some examples. Please review the application to remove such errors.*

RESPONSE:

1. The Peak Horizontal Ground Acceleration for a 1,000 return is 0.05g instead of the 0.03g as incorrectly stated in LA Section 1.6.4.2.

License Documentation Impact: The fourth paragraph of LA former Section 1.6.4.2 - now Section 1.7.4.2 (RAI-RP 13) and former Table 1-7 (now Table 1-8, see RAI GI-9D) will read:

Probabilistic ground motion for the sites is also shown in Table 1-~~7~~8. Seismic activity is well documented as the result of ~~the NEF LA~~licensing activities of an enrichment facility located near Eunice, New Mexico and the extensive network of seismometers established for a Waste Isolation Pilot Plant (WIPP) facility near Carlsbad, New Mexico. The Peak Horizontal Ground Acceleration (pga) for a 1,000 and 2,500 year return is ~~0.03~~0.05g and 0.12g respectively (USGS, 2002).

Table 1-~~7~~8 Seismic Criteria for New Mexico Site

P=1/T **EP=1-(1-P)^n** **n=50 years**

T	500 yrs	1000 yrs	2500 yrs
P	0.002 (.2%)	0.001 (.1%)	0.0004 (.04%)
EP	0.1 (10%)	0.05 (5%)	0.02 (2%)
n	50 yrs	50 yrs	50 yrs
pga	0.03g [(1)]	0.05g [(2)]	0.12 [(2)]

[(1)] Weber, 2008; [(2)] USGS, 2002

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RESPONSE:

2. The negative sign for the Celsius temperatures listed in LA Table 1-6 on Page 1-39 was inadvertently omitted.

License Documentation Impact: Temperatures in former Table 1-6 - now Table 1-7(see RAI GI-9D) of Revision A of the IIFP License Application and the temperatures in Table 3-17 of Revision A of the IIFP Environmental Report (see also RAI GI-10A) will be revised as follows:

21.7 °C (-7 °F) will be revised to -21.7 °C (-7.1 °F) for January 11, 1962.
23.9 °C (-11 °F) will be revised to -23.9 °C (-11 °F) for February 1, 1951.
16.1 °C (3 °F) will be revised to -16.1 °C (3 °F) for December 8, 2005.

RESPONSE:

3. The ISA Summary Section 1 provides a site description which focuses on those factors that could impact safety (geography, meteorology, seismology, etc.) of the site and surrounding area.

License Documentation Impact: The second sentence of the IIFP License Application Section 3.2.1 will be revised to read as follows:

The ISA Summary (IIFP, 2009) provides a description of the IIFP Facility and the surrounding Owner Controlled Area (herein referred to as the IIFP Site). A description of the IIFP Site focusing on those factors that could impact safety is contained in ISA Summary, Section ~~2~~1 and a summary description of those factors is in LA ~~Chapter 1~~ Section 1.6.

RESPONSE:

4. The ISA Summary Section 2.1, "Overview of Facility Site," provides a layout of the facilities on the site with a summary description of the facilities and the location of those facilities.

License Documentation Impact: License Application Section 3.2.2 will be revised as follows:

The ISA Summary (Section ~~3~~2.1) provides a description of the IIFP Facility. A summary description of the IIFP Facility is provided in LA ~~Chapter 1~~ Section 1.1.

RESPONSE:

5. The ISA Summary Table 1-1 was inadvertently corrupted when copying and editing Table 3-18 of the Environmental Report to the LA.

License Documentation Impact: Table 1-1 of Revision A of the IIFP Integrated Safety Analysis Summary will be deleted and replaced with revised (see RAI GI-10A) ER Table 3-18 above and be numbered as Table 1-1 in the LA. The renumbered Table 1-1 will incorporate

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changes to ER Table 3-18 (in response to RAI GI-10A) listing the mean snowfall for 1976 as 0.25 cm instead of 0.025 cm and the annual mean snowfall will be corrected from 12.95 cm (5.1 in) to 11.93 cm (4.7 in).

RESPONSE:

6. ISA Summary Table 1-2 will be revised as stated below and as in the response to RAI GI-10 A.

License Documentation Impact: The low extreme temperatures in Table 1-2 of Revision A of the IIFP Integrated Safety Analysis Summary and Table 3-17 of Revision A of the IIFP Environmental Report will be revised as follows:

21.7 °C will be revised to -21.7 °C for January 11, 1962.
23.9 °C will be revised to -23.9 °C for February 1, 1951.
16.1 °C will be revised to -16.1 °C for December 8, 2005.

RESPONSE:

7. The LA is currently under review in response to the RAIs as well as a general review for typos or corrections need to be made.

License Documentation Impact: Once agreement has been attained on IIFP's response to the LA RAIs, the LA will be revised and submitted to the NRC as Revision B.

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SS-2. Background:

The regulations in 10 CFR 70.64(a)(2) require the applicant to include adequate protection against natural phenomena in its design of the facility, and 10 CFR 70.62(c)(iv) requires the applicant to conduct and maintain an ISA that identifies potential accident sequences caused by credible external events. In addition,

10 CFR 70.61(b) and 70.61(c) require the applicant to demonstrate that an accident event can be excluded from further consideration based on either its likelihood or its consequences.

Issue:

The applicant discussed the historical data of tornado, straight wind, snow, rain, and flood at the facility site in LA Sections 1.6.3.3, Severe Weather, and 3.2.5.2, Hazard Identification; ISA Summary Sections 1.3.2, Severe Weather, 4.4.2, Natural Phenomena Hazards, and 5.2.1 Hazard Identification Method, and Tables 3-6, FEP/DUP Facility Hazards Identification and 5-3, FEP/DUP Facility Hazard Identification Checklist. The applicant concluded in the ISA Summary Table 5-3 (Items 18.4, 18.5, and 18.6) that the rain, snow, and straight wind are low-risk hazards for the IIFP Fluorine Extraction Process & Depleted Uranium De-Conversion Plant (FEP/DUP). The justification the applicant provided for this determination at the end of ISA Summary Section 5.2.1 is not sufficient for the NRC staff to determine whether the justification is acceptable because the applicant did not provide justification on its low-risk determination. Nor, did the applicant characterize these hazards at an annual probability level consistent with their risk level. The applicant did include tornado-generated missiles as a hazard for consideration of the process equipment located outside the buildings. However, the applicant did not indicate the type of missiles it considered in its ISA.

Request:

1. *Characterize tornado and tornado-generated missile, straight wind, snow, rain, and flood hazards at an annual probability level (i.e., not unlikely, unlikely, or highly unlikely) consistent with their risk (i.e., low, intermediate, or high chemical or radiological consequence).*

2. *Provide technical basis to justify the perceived risk level for each of the hazards identified in Item 1.*

RESPONSE:

1. Characterizations of tornadoes/winds, snow, rain and flood hazards have been performed. The following includes a discussion of those characterizations and changes to be made to Revision A of the IIFP Integrated Safety Analysis Summary.

Floods/Rain

It was determined that the information provided regarding "Floods" in former section 1.3.2.8 (now Section 1.3.2.6, in response to RAI GI-10D) of Revision A of the IIFP Integrated Safety Analysis Summary was insufficient in its scope. This section was expanded to explain design

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basis flooding considerations. A preliminary flood hazard assessment for the IIFP Facility was performed using Department of Energy (DOE) documents DOE-STD-1020-2002, DOE-STD-1022-94 and DOE-STD-1023-95, and it was determined that a comprehensive flood hazard assessment is not required. Preliminary screening indicates that flooding is not a design basis event other than in consideration of storm water runoff which will be included in the detailed facility design with an engineering margin for storm sewer loading.

Guidelines in the following Department of Energy (DOE) documents were used to perform a flood hazard assessment for the IIFP Facility near Hobbs, NM: DOE-STD-1020-2002, DOE-STD-1022-94 and DOE-STD-1023-95. Based on the information included herein and the guidance provided in these documents, it was determined that a comprehensive flood hazard assessment is not required. Preliminary screening indicates that flooding is not a design basis event other than in consideration of storm water runoff which will be included in the detailed facility design.

All-season precipitation estimates for the IIFP Site are provided by the National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA) in the "Point Precipitation Frequency Atlas of the United States, NOAA Atlas 14 (Bonin, et.al., Revised 2011) and its associated database. Using a linear least-squares regression procedure to extrapolate NOAA's precipitation estimates to an average recurrence interval of 100,000 years, it was determined that the 1-hour, 24-hour, and 48-hour all-season precipitation estimates for 1.0×10^{-5} annual probability are 7.2 inches, 14.4 inches, and 17.0 inches respectively.

Based upon the above precipitation estimates for the site and information presented in Table 3-24 (former 3-21) of the IIFP "Environmental Report", the facility will be designed to prevent flooding from extreme precipitation of short duration. In the area north and northwest of the developed IIFP Site, berms will be added or the terrain will be contoured to divert run-on water around the site so that only precipitation that falls on the site itself will affect the facility design. The site storm sewer will be designed for a 17.0 inch rainfall over a 48-hour period (1×10^{-5} annual probability). Structures containing SSCs are constructed above grade level and above the level of plant roadways in order to physically remove (elevate) them from potential floodwater. Structures will be provided with curbing a minimum of 12 inches in height in order to prevent internal spills (in such an event) from leaving the structure; this curbing also serves as flood barriers for these structures.

Tornado/Wind

The evaluation of tornadoes and straight winds was made based on NUREG/CR-4461, Revision 2 (February, 2007) including data in Appendices A, B and C of the NUREG. This NUREG guide provides calculations based upon 46,800 tornado segments occurring from January 1, 1950 through August 2003 of which more than 39,600 had sufficient information on location, intensity, length, and width to be used in the analysis included in this report. NUREG/CR-4461, Revision 1 had been published in April 2005. The National Weather Service changed from using the Fujita Scale to the Enhanced Fujita Scale in February 2007. Revision 2 incorporates the Enhanced Fujita Scale in its methodology and calculations. Specifically, Chapter 5 of the NUREG has been revised to show $1x10^{-5}$, $1x10^{-6}$, and $1x10^{-7}$ probability design wind speeds (i.e., probability of

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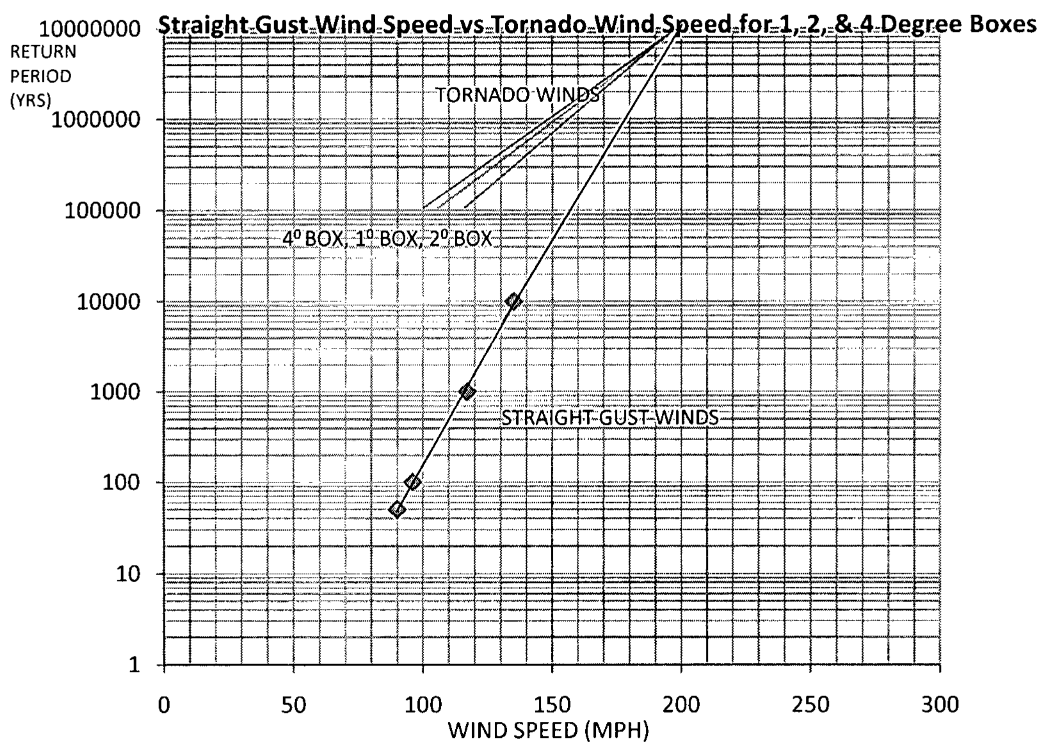
exceeding that wind speed in one year) for the contiguous United States estimated using the above database and the Enhanced Fujita Scale. (NCDC, 2010b)

The two-degree box where the IIFP site is located is in Region 2. While the two-degree and four-degree boxes are considered to be more reliable since they contain data for more events, the document does allow the use of the one-degree data if the number of events is large enough to provide accurate calculations. Instructions for using the NUREG Appendix C, Results for one-degree boxes state that the data set should contain a minimum of 10 events with 20 or more events being desirable. There were 76 events reported for the one degree box whose SE corner is the $32^0/103^0$ gridline. Of these, 56 were used in the calculations. The four-degree box uses data from 364 events of the 435 events observed.

The data from the above NUREG appendices for the one-degree, two-degree, and four-degree boxes are used. The maximum tornado wind speeds versus return period for each box are plotted on the same chart with the straight gust wind speed data (DOE-1020-2002, Table 3-2) versus return period for sites with basic gust wind speed of 90 mph (per USGS maps as adopted by the model building codes). All three tornado wind speed curves intersect the straight gust wind speed curve at approximately a 1×10^7 year return period or a probability of exceeding of 1×10^{-7}. DOE-STD-1022-2002, Appendix D, Paragraph D.2 states that, generally, straight and hurricane winds control the criteria for probabilities down to about 10^{-4}. Therefore, straight gust wind speeds will be used as the wind design basis for building design at the IIFP Facility.



Legend: 4° Box - Red; 1° Box - Green; 2° Box - Blue

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Note: See the discussion of straight winds below for the derivation of basic gust wind speeds versus probability used in the plots discussed above.

Design wind speeds for all buildings and structures that do not contain licensed material or for buildings and structures containing chemicals or processes that do not affect licensed material will be determined in accordance with the applicable model building codes (New Mexico Commercial Building Code (NMCBC, 2006) and American Society of Civil Engineers (ASCE 7-05) or latest editions adopted by the State of New Mexico at time of design). Specifically, these buildings and structures will be designed for a minimum straight gust wind speed of 90 mph.

Design wind speeds for all buildings and structures containing licensed material or buildings and structures containing chemicals or processes affecting licensed material are determined in accordance with NUREG-1520, Revision 1 (Appendix D and Annex to Appendix D) by reference to DOE-STD-1020-2002.

DOE-STD-1020-2002 Table 3-2 lists recommended peak gust wind speeds for Category C exposure and for tornadoes at 10m (33 ft) above the ground versus "Performance Category and Annual Probability of Exceedance" for 23 DOE sites across the United States.

By definition, DOE Performance Category 3 (PC-3) buildings and other structures are buildings and other common structures not classified as PC-4 structures which contain sufficient quantities of toxic or explosive substances to be dangerous to the public if released. PC-4 SSCs are designated as "reactor like" in that the quantity of hazardous material and energy is similar to a large Category A reactor (>200MW_t). For the purposes of evaluating risks and determining design basis criteria relative to natural phenomena events, the IIFP conservatively used the equivalent PC-3 category for the IIFP process buildings and other structures containing licensed material or process buildings containing processes or materials potentially affecting licensed materials. This designation is consistent with Occupancy Category III buildings and structures as defined in ASCE 7-05 Table 1-1(DOE G 420.1-2, 3/28/00).

DOE-STD-1020-2002, Table 3-2 lists design wind speeds and probabilities of exceeding the speeds for straight winds and for tornadoes for several DOE sites for Performance Categories PC-1 thru PC-4 structures. DOE Performance Categories are used below for illustrative purposes in determining the design wind speed and probability of exceeding the speed for the IIFP Facility site. The design wind speeds listed in DOE-STD-1020-2002, Table 3-2 for PC-1 structures (2×10^{-2} probability of exceeding the speed) are consistent with the USGS wind speed maps adopted by the International Building Code (IBC-2006) and ASCE 7-05. For all cases cited, where the design wind speed for PC-1 structures per the USGS wind speed maps is 90 mph (2×10^{-2}), the design wind speed per DOE-STD-1020-2002, Table 3-2 for PC-2 structures is 96 mph (1×10^{-2}), for PC-3 structures is 117 mph (1×10^{-3}) and for PC-4 structures is 135 mph (1×10^{-4}).

Per Table D-2 in DOE-STD-1020-2002, Appendix D, the performance goal for a PC-3 facility is to design for the facility to withstand a straight-line wind load that occurs at a frequency of 1×10^{-4}. This criteria can be met in two ways: 1) design the facility to survive the force of winds with an occurrence probability of 1×10^{-4} (135 mph), or 2) design the facility to withstand a straight-line wind load of 1×10^{-3} (117 mph), but incorporate factors of safety such that the Ratio of Hazard to Performance Probability is equal to or greater than 10 using the methodology in Appendix D of

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DOE-STD-1020-2002. IIFP decided to use the first approach for meeting the performance criteria by designing PC-3 structures to withstand a 135 mph straight-line wind. At this design wind speed and probability of exceeding the speed, no credit is taken for the Ratio of Hazard to Performance Probability allowed in DOE-STD-1020-2002, Appendix D, Table D-2, even though conservatism will be achieved in the design due to factors of safety inherent in the design process and in material allowable stress specifications. From the evaluation that was performed, it was determined that the likelihood of a tornado generating winds at 135 mph was much lower for this area with a probability of less than 10^{-5}. Also, according to Appendix A of NUREG/CR-4461, Rev.2, the two-degree box which contains the IIFP Site has a tornado strike probability of 8.444 x 10^{-5} yr^{-1}. Strike probabilities for the one-degree and four-degree boxes are 5.235 x $10^{-5}yr^{-1}$ and 3.975 x 10^{-5} yr^{-1} respectively. Therefore, facility design of PC-3 structures to a 135 mph wind speed at the 10^{-4} probability level represents a conservative approach with respect to wind speed.

The IIFP facility building and structures that contain hazardous radiological and chemical (if applicable) materials that must be controlled or mitigated to meet the performance criteria given in 10 CFR part 70.61, "Performance Requirements," are defined as PC-3 structures per the Natural Phenomena Hazard Evaluation methods prescribed in DOE-STD-1020-2002. As mentioned above, those structures will meet the performance category of 1 x 10^{-4}, which is designed to withstand a 1 x 10^{-4} probability per year occurrence straight-line wind event. Hence, based on the order of magnitude scale for determining event likelihood using the ISA methodology in NUREG-1520, Rev. 1, the collapse or loss of the building integrity is considered to be highly unlikely and meets the qualitative frequency scale of 1 x 10^{-5} per year or less. Events that occur at a highly unlikely frequency meet the performance criteria for acceptable risk without the need to further reduce the likelihood of hazardous release or mitigate its consequences. Therefore, designing the PC-3 facilities to withstand straight-line wind events with an occurrence frequency of 1 x 10^{-4} per year meets ISA risk acceptance levels regardless of the hazardous material inventories within the facilities and without consideration to mitigation of any hazardous release.

Snow

Snow was not addressed in the IIFP Integrated Safety Analysis Summary. A section that discusses the "snow hazard" will be added to the IIFP Integrated Safety Analysis Summary and the new text is shown in the License Documentation Impacts below.

RESPONSE:

2. The ISA Summary Section 5.2.1 is intended to discuss PHA methodology and not the characterization and justifications for the hazards assessment. The three paragraphs immediately following Table 5-3 in the Section 5.2.1 of the ISA Summary Revision A are being removed because the information in those paragraphs are not part of the description of the PHA methodology. Instead, the natural phenomena hazard characterization and the technical basis for justification of the perceived risk levels are provided in the above discussions and further clarified in the ISA Revision A changes shown below.

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License Documentation Impact: Former Section 1.3.2.8 – new Section 1.3.2.6 (in response to RAI GI-10D) of Revision A of the IIFP Integrated Safety Analysis Summary will be deleted and replaced with the following:

1.3.2.86 Floods

~~The IIFP site does not fall within 100-year or 500-year floodplains (IIFP, 2009). The site is located in a semi-arid location with limited bodies of water.~~The site is located in an area which has a semi-arid climate with an average rainfall of 12 to slightly less than 16 inches per year as recorded for Hobbs city (15.93 in/yr), Hobbs airport (12.35 in/yr), Pearl, NM (13.91 in/yr), and Roswell, NM (14.66 in/yr). This information was obtained from the Western Regional Climate Center website. The nearest river is the Pecos River to the southwest which is approximately 50 miles or greater from the site. Since there are no significant bodies of water or rivers within several miles of the site, it is expected that any flooding would be due to extreme short-term precipitation which could result in flash flooding. According to information obtained from NOAA National Climate Data Center (NCDC) Storm Events, there have been 68 flood events in Lea County, New Mexico between 1/1/1950 and 2/28/2010, an average of approximately one per year. Of these 68 events, there were no deaths reported, and property damage was reported for only 14 of the events, all of which occurred in the cities and towns of Lea County. Twenty-nine of the 68 events were reported for Hobbs which is located at an elevation from 125 to 170 feet lower than the site and approximately 11.4 miles to the east. The Hobbs airport is at an elevation of about 125 feet lower and some 6.9 miles southeast of the site, and it is also in FEMA Zone D and unmapped. The IIFP property would be expected to receive some drainage from highway 483 on the west and possibly from the north as parts of these areas are at slightly higher elevations than the proposed facility location. However, site topography would indicate that water would drain away from the ~~site~~ property toward the east and south as gradual elevation declines occur in those directions for several miles. According to the FEMA Mapping Information Platform, the area where the IIFP Facility is located has not been mapped; the site does not lie within areas that have been mapped and that lie within the 100-year floodplain in and around Hobbs, New Mexico. Guidelines in the following Department of Energy (DOE) documents were used to perform a flood hazard assessment for the IIFP Facility near Hobbs, NM: DOE-STD-1020-2002, DOE-STD-1022-94 and DOE-STD-1023-95. Based on the information included herein and the guidance provided in these documents, it was determined that a comprehensive flood hazard assessment is not required. Preliminary screening indicates that flooding is not a design basis event other than in consideration of storm water runoff which will be included in the detailed facility design.

All-season precipitation estimates for the IIFP Site are provided by the National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA) in the "Point Precipitation Frequency Atlas of the United States, NOAA Atlas 14 (Bonin, et.al., Revised 2011) and its associated database. Using a linear least-squares regression procedure to extrapolate NOAA's precipitation estimates to an average recurrence interval of 100,000 years, it was determined that the 1-hour, 24-hour, and 48-hour all-season precipitation estimates for 1.0×10^{-5} annual probability are 7.2 inches, 14.4 inches, and 17.0 inches respectively.

Based upon the above precipitation estimates for the site and information presented in Table 3-24 (former 3-21) of the IIFP "Environmental Report", the facility is designed to prevent flooding

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from extreme precipitation of short duration. In the area north and northwest of the developed plant site, berms will be added or the terrain will be contoured to divert run-on around the site so that only the precipitation that falls on the developed portion of the site will affect plant design. The site storm sewer system is designed for a 17.0 inch rainfall over a 48-hour time period. Structures containing SSCs are constructed above grade level and above the level of plant roadways in order to physically remove (elevate) them from potential floodwater. Structures are provided with curbing a minimum of 12 inches in height in order to prevent internal spills (in such an event) from leaving the structure, and this curbing also serves as flood barriers for those structures.

License Documentation Impact: Section 1.4.5 of Revision A of the IIFP Integrated Safety Analysis Summary will be revised as follows:

1.4.5 Design-Basis Flood Events Used for Accident Analysis

The IIFP ~~FEP/DUP~~ S~~s~~ite ~~is located outside~~ has not been mapped but does not lie within areas that have been mapped and that are in the 100-year flood-plain~~.~~; in and around Hobbs, New Mexico according to information provided in the FEMA Mapping Information Platform. A discussion of the IIFP flood hazard assessment is provided in Section 1.3.2.6 of the ISA. The likelihood of any major flood at the plant site is determined to be ~~was~~ low and the consequences are ~~were~~ limited (due to no fissile material existing at the site). Thus, flood type accidents are not a significant risk for plant operations.

License Documentation Impact: Section 1.3.2.3 of Revision A of the IIFP Integrated Safety Analysis Summary will be deleted and replaced with the following:

1.3.2.3 Extreme Winds

~~Wind speeds over the State of New Mexico are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months and sometimes occur just in advance of thunderstorms. Frontal winds may exceed 30 mile/hr for several hours and reach peak speeds of more than 50 mile/hr.~~

This section describes the basis for evaluation of wind loading on the structures at the IIFP Facility in Lea County, New Mexico. Three sources of wind loading are evaluated: wind loading from a hurricane, straight wind loading and wind loading from a tornado.

Hurricanes

The IIFP Facility site is located in the extreme southeastern portion of New Mexico and over 500 miles inland from the Gulf of Mexico. Hurricane winds dissipate over Louisiana and Texas enough to prevent a wind damage threat to the IIFP Facility site as evidenced by the following information provided by NOAA, National Climatic Data Center (NCDC).

According to NOAA/ NCDC, of the 155 thunderstorm events recorded between 01/01/59 and 02/28/10, the maximum thunderstorm wind speed recorded for Lea County was 80 knots (92.1

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mph) on 07/14/89. Some of these thunderstorm events likely would have been the result of dissipated hurricanes. (NCDC, 2010a)

Tornadoes and Straight Winds

NOAA NCDC Storm Events includes information for 527 tornado events reported for the state of New Mexico for the period 1950-2010 for an average of 8.78 events per year. Lea County reported 92 tornadoes for the same period for an average of 1.53 tornadoes per year. Of these 92 tornado events for Lea County between 01/01/50 and 01/31/10, 63 - F0, 20 - F1, 8 - F2, and one-F3 tornadoes were reported. During this same sixty-year period, no F4 or F5 tornadoes were reported. (NCDC, 2010a)

The evaluation of tornadoes and straight winds was made based on NUREG/CR-4461, Revision 2 (February, 2007) including data in Appendices A, B and C of the NUREG, DOE-1020-2002 and DOE-STD-1022-2002 including Appendix D. It was determined from this evaluation that straight gust wind speeds will be used as the design basis for buildings and structures at the IIFP Facility. Design wind speeds for all buildings and structures that do not contain licensed material or for buildings and structures containing chemicals or processes that do not affect licensed material will be determined in accordance with the applicable model building codes (New Mexico Commercial Building Code (NMCBC, 2006) and American Society of Civil Engineers (ASCE 7-05) or latest editions adopted by the State of New Mexico at time of design). Specifically, these buildings and structures will be designed for a minimum straight gust wind speed of 90 mph.

Design wind speeds for all buildings and structures containing licensed material or buildings and structures containing chemicals or processes affecting licensed material are determined in accordance with NUREG-1520, Revision 1 and by reference to DOE-STD-1020-2002 which, in Table 3-2, lists recommended peak gust wind speeds for Category C exposure and for tornadoes at 10m (33 ft) above the ground versus "Performance Category and Annual Probability of Exceedance" for 23 DOE sites across the United States.

By definition, DOE Performance Category 3 (PC-3) buildings and other structures are buildings and other common structures not classified as PC-4 structures which contain sufficient quantities of toxic or explosive substances to be dangerous to the public if released. PC-4 SSCs are designated as "reactor like" in that the quantity of hazardous material and energies similar to a large Category A reactor (>200MW_t). For the purposes of evaluating risks and determining design basis criteria relative to natural phenomena events, the IIFP conservatively used the equivalent PC-3 category for the IIFP process buildings and other structures containing licensed material or process buildings containing processes or materials potentially affecting licensed materials. This designation is consistent with Occupancy Category III buildings and structures as defined in ASCE 7-05 Table 1-1(DOE G 420.1-2, 3/28/00).

DOE-STD-1020-2002, Table 3-2 lists design wind speeds and probabilities of "exceeding" for straight winds and for tornadoes for several DOE sites for Performance Categories PC-1 thru PC-4 structures. The design wind speeds listed in Table 3-2 for PC-1 structures (2×10^{-2} probability of "exceeding" in one year) are consistent with the USGS wind speed maps adopted by the International Building Code (IBC-2006) and ASCE 7-05. For all cases cited, where the design wind speed for PC-1 structures per the USGS wind speed maps is 90 mph (2×10^{-2}), the design

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wind speed per Table 3-2 for PC-2 structures is 96 mph ($1x10^{-2}$), for PC-3 structures is 117 mph ($1x10^{-3}$) and for PC-4 structures is 135 mph ($1x10^{-4}$).

Per Table D-2 in DOE-STD-1020-2002, Appendix D, the performance goal for a PC-3 facility is to design for the facility to withstand a straight-line wind load that occurs at a $1x10^{-4}$. This $1x\ 10^{-4}$ performance goal is met at the IIFP Facility by designing applicable structures (as defined above) using a 135 mph straight wind gust at the $1x\ 10^{-4}$ probability level where no credit is taken for the Ratio of Hazard to Performance Probability allowed per Table D-2. Therefore, the IIFP design basis wind speed is one order of magnitude more conservative than the design basis required by DOE for PC-3 structures where a hazard probability of $1x10^{-3}$ with a Ratio of Hazard to Performance Probability of 10 may be used to meet the performance goal of $1\ x\ 10^{-4}$.

From the evaluation that was performed, it was determined that the likelihood of a tornado generating winds at 135 mph is at a probability level of less than $1x10^{-5}$. Also, according to Appendix A of NUREG/CR-4461, Revision 2, strike probabilities for the one-degree, the two-degree and the four-degree boxes containing the IIFP site are $5.235\ x\ 10^{-5}yr^{-1}$, $8.444\ x\ 10^{-5}\ yr^{-1}$ and $3.975\ x\ 10^{-5}\ yr^{-1}$ respectively. Therefore, selection of a design basis wind speed for IIFP PC-3 structures of 135 mph at the $1x10^{-4}$ probability level represents a conservative approach. The IIFP facility building and structures that contain hazardous radiological and chemical (if applicable) materials that must be controlled or mitigated to meet the performance criteria given in 10 CFR part 70.61, "Performance Requirements," are defined as PC-3 structures per the Natural Phenomena Hazard Evaluation methods prescribed in DOE-STD-1020-2002. As mentioned above, those structures will meet the performance category of $1x10^{-4}$, and be designed to withstand a $1x10^{-4}$ probability per year occurrence straight-line wind event. Hence, based on the order of magnitude scale for determining event likelihood using the ISA methodology in NUREG-1520, Rev. 1, the collapse or loss of the building integrity is considered to be highly unlikely and meets the qualitative frequency scale of $1x10^{-5}$ per year or less. Events that occur at a highly unlikely frequency meet the performance criteria for acceptable risk without the need to further reduce the likelihood of hazardous release or mitigate its consequences. Therefore, designing the IIFP applicable facilities to withstand straight-line wind events with an occurrence frequency of $1x10^{-4}$ per year meets ISA risk acceptance levels regardless of the hazardous material inventories within the facilities and without consideration to mitigation of any hazardous release.

License Documentation Impact: Additional references will be included in Section 1.8 of the IIFP License Application (LA) for (ASCE, 2006) and (DOE, 2002). The following subheading and text for Snow will be inserted in former LA Section 1.6.3.3 – new LA Section 1.7.3.3 (renumbered in response to RAI RP-13) after subheading Floods and text of the IIFP License Application.

Snow

The mean annual snowfall is 5.1 inches as recorded at the Hobbs weather station with a high annual total of 27.1 inches. The historical maximum snow depth for Hobbs, NM is 12.2 inches and it occurred during the month of November. The 2-day 100-year snowfall is 12.1 inches which also occurred in November.

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The design basis extreme environmental roof load for the process buildings (involving or affecting licensed material) at the IIFP Site is 81.2 lb/ft^2 or 396.8 kg/m^2. This design load is based on the sum of the 100-year return period snowpack and the load corresponding to the 48-hour all-season precipitation and an annual probability of 1.0 x 10^{-5} for the facility site area. (Refer to the IIFP Integrated Safety Analysis Summary Section 1.3.2.7 for an additional description of determining the design basis snow load).

1.8 References

ASCE, 2006. American Society of Civil Engineers, ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures: SEI/ASCE 7-05 (ASCE Standard)." 2006.

DOE, 2002. U.S. Department of Energy, DOE STD-1020-2002, "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities." Washington, D.C., January 2002.

License Documentation Impact: Add additional references to Section 1.6 of the IIFP ISA Summary for (ASCE, 2006) and (DOE, 2002). A new Section 1.3.2.7 "Snow" (below new Section 1.3.2.6 "Floods", numbering change in response to RAI 10 GI-10D) will be added to the IIFP ISA Summary, Revision A to read as follows:

1.3.2.7 Snow

The mean annual snowfall is 5.1 inches as recorded at the Hobbs weather station with a high annual total of 27.1 inches. The historical maximum snow depth for Hobbs, NM is 12.2 inches, and it occurred during the month of November. The 2-day 100-year snowfall is 12.1 inches which also occurred in November.

The design basis extreme environmental "ground" snow load for the IIFP Site is 96.7 lb/ft^2 or 472.5 kg/m^2. This design basis ground snow load is calculated as the sum of the 100-year return period snowpack and the load corresponding to the 48-hour all-season precipitation and an annual probability of 1.0 x 10^{-5} for the facility site. The method of determination follows acceptable methodology discussed in NRC NUREG-1951(NRC, 2010). The roofs of all process buildings (involving or affecting licensed materials) at the IIFP Facility site will be sloped at a minimum of 5/12 or 22.6 degrees. Using the method described in American Society of Civil Engineers Standard 7-05 "Minimum Design Loads for Buildings and Other Structures" (ASCE 7-05) to convert the ground snow load into a "roof" snow load, the design basis extreme environmental "roof" snow load for the buildings on the IIFP Facility is 81.2 lb/ft^2 (396.8 kg/m^2). This calculation assumes no runoff of snow or rain notwithstanding that roofs of IIFP process buildings (involving or affecting licensed materials) are sloped. This load represents the extreme roof snow load for the purpose of building design.

IIFP used the data collected by the Western Regional Climate Center (WRCC) for the Hobbs, New Mexico area to determine that the 100-year snowpack was 12.2 inches resulting in a normal (severe) design basis ground snow load of 8.4 lb/ft^2 (41.0 kg/m^2) (NRC, 2010). Since essentially 100 years of snowpack data was available for the area, no calculation or extrapolation of the data was necessary.

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All-season precipitation estimates for the IIFP Site are provided by the National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA) in the "Point Precipitation Frequency Atlas of the United States, NOAA Atlas 14 (Bonin, et. al., Revised 2011 and supersedes the "Two-to-Ten Day Precipitation for Return Periods of 2 to 100 Years in the Contiguous United States", 1964) and its associated data base. Using a least-square regression procedure to extrapolate NOAA's precipitation estimates it was determined that the 48-hour all-season precipitation frequency estimate for 1.0×10^{-5} annual probability is 17.0 inches. This 17.0 inches of precipitation (as water) corresponds to a ground snow load of 88.3 lb/ft^2 or 431.5 kg/m^2. The sum of the ground snow load from precipitation and from snowpack is 96.7 lb/ft^2 or 472.5 kg/m^2 from which the roof snow design load (81.2 lb/ft^2 or 396.8 kg/m^2) is determined as described above.

1.6 References

ASCE, 2006. American Society of Civil Engineers. ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures: SEI/ASCE 7-05 (ASCE Standard)." 2006

DOE, 2002. U.S. Department of Energy, DOE STD-1020-2002, "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities." Washington, D.C., January 2002.

NRC, 2010. Nuclear Regulatory Commission, NUREG-1951 "Safety Evaluation Report for the Eagle Rock Enrichment Facility in Bonneville County, Idaho, AREVA Enrichment Services LLC", Pages 1-23 to 1-25.

License Documentation Impact: Paragraphs two, three and four in Section 5.2.1(immediately following Table 5-3) are removed.

5.2.1 Hazard Identification Method

The initial activity of the ISA was a review of the preliminary hazards, specific engineering design files, PFDs, and P&IDs. The information obtained from this review enabled the analysts to identify hazards associated with specific process areas. The hazards were subsequently categorized and documented in a checklist (Table 5-3), including those hazards identified as standard industrial hazards (SIH) covered by OSHA requirements and not considered separate initiating events. The hazards identification information was then used to develop a more detailed PHA.

~~There are a number of vehicle in motion hazards that are not considered in the PHA. An aircraft crash typically consists of an initial impact of the aircraft with the ground and a slide into the facility (direct impact is possible but much less likely). This event is extremely unlikely even for very large structures. For FEP/DUP process buildings and all other facilities on the site, a large aircraft crash is judged to be beyond extremely unlikely and is not considered further.~~

~~Impacts from general aviation planes or helicopters are credible but extremely unlikely. Although the damage potential to FEP/DUP facilities has not been quantified, it is reasonable to assume that the building structures that are designed and built to seismic criteria are sufficient to protect~~

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~~the hazardous materials within the buildings. Therefore, radiological and/or hazardous material releases are minimal. Since small aircraft and/or helicopter crashes are considered low risk and are not considered further in the PHA.~~

~~High wind, snow loading, flooding, and other NPH events are not considered separately. Due to the seismic design capacity of the process buildings, the FEP/DUP Plant is expected to withstand these hazards with minimal damage. Although toppling of equipment or lightning-induced fires may be possible, radiological and/or hazardous material releases are minimal. Therefore, these NPH events are considered low risk and are not considered further.~~

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SS-3. Redacted

Redacted pages 16-23

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SS-4. *Background:*
The regulations in 10 CFR 70.64(a)(4) require the applicant to include adequate protection against environmental conditions and dynamic effects in its design of the facility, and 10 CFR 70.62(c)(iv) requires the applicant to conduct and maintain an ISA that identifies potential accident sequences caused by credible external events. In addition, 10 CFR 70.61(b) and 70.61(c) require the applicant to demonstrate that an accident event can be excluded from further consideration based on either its likelihood or its consequences.

Issue:
In LA Section 3.2.5.2, Hazard Identification and ISA Section 5.2.1, Hazard Identification Method and Table 3-6, FEP/DUP Facility Hazards Identification, the applicant excluded aircraft crash as a potential external hazard from further consideration for facility design and in the ISA for the proposed FEP/DUP. IIFP justified this exclusion by stating that "An aircraft crash typically consists of an initial impact of the aircraft with the ground and a slide into the facility (direct impact is possible but much less likely). This event is extremely unlikely even for very large structures. For FEP/DUP process buildings and all other facilities on the site, a large aircraft crash is judged to be beyond extremely unlikely and is not considered further (Underline added)." However, IIFP did not provide quantitative assessment of the probability of aircraft crash hazard to the FEP/DUP to justify the exclusion.

Request:
Provide an aircraft crash hazard analysis to demonstrate that aircraft crash hazard is highly unlikely for the IIFP FEP/DUP site.

RESPONSE: A new section will be added to the ISA Summary to address nearby air transportation (Section 1.2.4.3) assessing the risks from aircraft hazards. This new section also addresses military operations.

License Documentation Impact: In addition, a new Section 1.2.4.3, "Nearby Air Transportation," will be added to the ISA Summary. This section also addresses military operations hazards [See RAI SS-3 (i).] Section 1.2.4.3 will read as follows:

1.2.4.3 Nearby Air Transportation

An aircraft hazard risk determination (IIFP, 2011) has been conducted. This analysis follows the methodology as described in Standard Review Plan (SRP) NUREG 0800 Section 3.5.1.6 for aircraft hazards evaluation (NRC, 2010). SRP 3.5.1.6 methodology is accepted by the U.S. Nuclear Regulatory Commission (USNRC) to assess the probability of hazards due to airport operations and aircraft transits near nuclear facilities.

SRP 3.5.6.1 proximity acceptance criterion 1A states that the probability of aircraft accidents with potential radiological consequences is considered to be less than about 1 x 10^{-7} per year if the site-to-airport distance, D, is between 5 and 10 statute miles and the projected annual number of operations is less than 500 D^2, or D is greater than 10 statute miles and the projected annual number of operations is less than 1000 D^2. Seventeen airports within 100 miles of the IIFP Facility were evaluated for the number of annual operations. The distance from the site to all the surrounding airports is greater than 5 statute miles and the acceptable number of operations

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permitted by this acceptance criterion is greater than the number of operations conducted at each airport multiplied by the distance factor. Based on the published number of operations and distances to the proposed IIFP site, this criterion has been met.

SRP 3.5.6.1 proximity acceptance criterion 1B states that the probability of aircraft accidents with potential radiological consequences is considered to be less than about 1 x 10^{-7} per year if the site is at least 5 statute miles from the edge of military training routes, including low-level training routes, except for routes used by more than 1000 flights per year or where activities (such as practice bombing) may create an unusual stress situation. There are four military routes within a 30 nautical mile radius of the proposed site. The closest approach is approximately 15 nautical (17 statute) miles southwest of the facility. The number of military operations at the Lea County Regional Airport is 561 annually. Additionally, there is a Special Use Airspace for two Military Operations Areas (MOAs) north of the IIFP site. The closest edge of the MOA is approximately 5 nautical (5.8 statute) miles from the facility. Thus, military operations, military training routes, or proximity to MOAs are not expected to pose any hazard to the proposed facility since these proximity criteria are met.

SRP 3.5.6.1 proximity acceptance criterion 1C states that the probability of aircraft accidents with potential radiological consequences is considered to be less than about 1 x 10^{-7} per year if the site is at least 2 statute miles beyond the nearest edge of a Federal airway, holding pattern, or approach pattern. Holding and approach patterns were evaluated for three airports within 20 miles of the IIFP site. These airports include:

- Lea County Regional Airport – 8 statute miles east southeast of the proposed facility site;
- Hobbs Industrial Airpark – 8.5 statute miles east northeast of the proposed facility site; and
- Lea County Zip Franklin Memorial Airport – 17 statute miles north northwest of the proposed facility.

For the Lea County Regional Airport, seven Instrument Flight Rule (IFR) procedures were evaluated for holding and approach patterns. There are no runways at the regional airport where the IFR landing/takeoff procedures would take aircraft within 2 statute miles of the IIFP site. During descent into the airport, the closest approach would be 6.5 nautical (7.5 statute) miles east southeast of the IIFP site. The Visual Flight Rule (VFR) landings/takeoffs from two runways would take aircraft no closer than 6.5 nautical (7.5 statute) miles from the site. The closest hold pattern is 6.5 nautical (7.5 statute) miles from the IIFP Facility. Thus for all seven IFR procedures for this regional airport, the IIFP site is at least 2 statute miles beyond the nearest edge of an approach or hold pattern. Holding and approach patterns for the Lea County Regional Airport meet SRP proximity criterion 1C.

The Hobbs Industrial Airpark has no instrument procedures or specific holding patterns. Assuming at least a 10 nautical mile visual landing approach of one runway, an aircraft could come within 3.5 nautical (4 statute) miles from the IIFP site. Using the other runway, aircraft could come within 5.5 nautical miles during the approach landing. This airpark has no air carrier, general aviation, or military operations, only operations from 32 airpark-based aircraft. The threshold limit provided in NUREG-0800 for air carrier, general aviation, and military operations is 37,400. Since no holding patterns exist for this airpark and the airpark poses no concern per

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SRP guidelines, the issue of holding patterns is not relevant for this airpark. No landing approach patterns are within 2 statute miles of the site. Holding and approach patterns for the Hobbs Industrial Airpark meet SRP proximity criterion 1C.

For the Lea County Zip Franklin Memorial Airport (E06), two IFR procedures were evaluated for holding and approach patterns. For the closest runway, the landing distance is 11.3 nautical miles with a 6 nautical mile holding pattern. At the southern-most point of the holding pattern, this would place an aircraft no closer than 16 nautical miles from the IIFP site. For VFR flights using the runway that would take aircraft the closest to the site, this would still put aircraft no closer than 16 nautical miles from the site assuming a 10 mile final approach. Thus, no holding or approach patterns are within 2 statute miles of the site. Holding and approach patterns for the E06 Airport meet SRP proximity criterion 1C.

There are four en-route high-level airways within 35 statute miles of the IIFP Facility. The closest airway is Q20 which passes 10.4 statute miles southwest of the IIFP Site. This Q20 airway meets the SRP proximity criterion 1C. There are three en-route low-level airways passing through the navigational aid HOB VORTAC. The closest airway (V68) passes 3.2 statute miles of the proposed site. Another airway (V291) is 4.7 statute miles from the site. The closest point to the V102 airway is 6.5 nautical miles from IIFP site. All three airways meet the SRP proximity criterion 1C. Even though no additional analysis is required to meet criterion 1C, calculations were performed as a further check that the annual probability of an aircraft crash into the target area from CFR Part 121 and Part 135 operations using the airway closest to the site (V68) is less than 10^{-7} per year for the SRP 3.5.1.6 acceptance criterion 1C.

Using the method provided in Section 3.5.1.6 of NUREG 0800, the probability of an aircraft on the V68 airway crashing onto the proposed facility was estimated to be 2.7×10^{-8} for CFR 121 operations. This probability makes the aircraft crash an incredible event and thus requires no further consideration in either design or integrated safety analysis.

Department of Energy (DOE) Standard 3014-2006 (DOE, 2006) offers an alternative analytic method to evaluate external risk from aircraft operations. To establish additional confirmation of the results obtained by the NRC method, the DOE method was also applied. Since the DOE method applies a different analytic approach, the results obtained via the DOE method are only relevant in comparison to the DOE threshold risk metric, which is not the same as the NRC risk metric. Based on the results from the DOE evaluation, the calculated probability of 3.3×10^{-7} crashes per year at the site is less than the DOE evaluation guideline of 1.0×10^{-6}. Therefore, the DOE method also demonstrates that the crash of an aircraft into the target areas is an incredible event and thus requires no further consideration in the integrated safety analysis.

All three proximity criteria of Section 3.5.1.6 have been met. Additional calculations estimate that the probability per year of an aircraft crashing into the plant from the closest Federal airway (V68) is less than the NRC acceptance criteria. Calculations also estimate the annual probability of an aircraft crashing into the plant from the same airway is less than the DOE acceptance criteria. This probability is well below the NRC threshold metric of 1×10^{-7} which means an aircraft crash into the target area is an incredible event and thus requires no further consideration in the integrated safety analysis.

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The aircraft hazards determination following the methodology in SRP Section 3.5.1.6 addressed military operations. There are military operations out of the nearby regional/international airports, including the Lea County Regional Airport and the Winkler County (WINK), Texas airport. The number of total operations from both airports, including the military operations, is far below the SRP Section 3.5.1.6 Acceptance Limit 1A. Additionally, there is a Special Use Airspace for two Military Operations Areas (MOAs) north of the IIFP Facility. The closest edge of the MOA is approximately 5 nautical (5.8 statute) miles from the facility. This is not expected to pose any hazard to the proposed facility, since the MOAs are more than 5 statute miles from the site (SRP Section 3.5.1.6 Acceptance Limit 1B). Four (4) IFR Military Training Routes are within a 30 nautical mile radius of the proposed site. The closest approach is about 17 nautical miles west from the IIFP Site. This is not expected to pose any hazard to the proposed facility, since the routes are more than 5 statute miles from the site, per SRP Acceptance Criterion 1B. Per SRP 3.6.1.5 Acceptance Criterion 1B, the probability of aircraft accidents is less than an order of magnitude of 1×10^{-7} per year if the plant is at least 5 statute miles from the nearest edge of military training routes, except for those associated with usage greater than 1000 flights per year. The Hobbs Regional Airport has the greatest number of military operations at 561 annually. Hence, no further analysis is required with regard to the impact of military training routes or military operations.

License Documentation Impact: Insert a new reference for an "Aircraft Hazard Risk Determination in Section 1.6.

1.6 References

IIFP, 2011. International Isotopes Fluorine Products, Inc., "Aircraft Hazard Risk Determination." 2011.

License Documentation Impact: The IIFP ISA Table 5-3 will be revised as follows for Item 17.1 (Airplanes) to identify "as applicable" to PHA because a hazard analysis has now been performed.

Item	**Hazard Energy Source or Material**	**Applicable to PHA?**		**Rationale***
		Yes	No	
17.1	Airplane	X	~~X~~	Considered ~~beyond extremely unlikely.~~ external initiating event.

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SS-5. *Background:*
The regulations in 10 CFR 70.64(a)(4) require the applicant to include adequate protection against environmental conditions and dynamic effects in its design of the facility, and 10 CFR 70.62(c)(iv) requires the applicant to conduct and maintain an ISA that identifies potential accident sequences caused by credible external events.

Issue:
LA Section 1.6.4, Geology and Seismology; and ISA Summary Section 1.5, Geology and Seismology, did not include the information needed to assess the potential effects of site soil seismic amplification, soil settlement, allowable bearing capacity, and liquefaction potential.

Request:
1. *Provide the geotechnical and geophysical investigation plan that will be used to collect the geotechnical properties of the site soils that will be needed for assessing seismic site response, determining soil settlement and allowable bearing capacity for design, and assessing liquefaction potential for the site.*
2. *Provide assessment of site soil seismic amplification, soil settlement, allowable bearing capacity, and liquefaction potential.*

RESPONSE:

1. At this time IIFP is providing information regarding the planned procedure, guidance and standard that it will used to conduct geotechnical and geophysical investigations to characterize the site soil and to make an assessment.

2. An assessment of site soil seismic amplification, soil settlement, allowable bearing capacity and liquefaction potential will be available upon completion of the geotechnical and geophysical investigation and analysis.

License Documentation Impact: A new Section 1.5.4 will be added to the IIFP ISA Summary Section 1.5, "Geology and Seismology" to describe the plan for geotechnical and geophysical investigation and analysis to read as follows:___

1.5.4 Geotechnical and Geophysical Investigation and Analysis

A preliminary geotechnical and geophysical investigation and analysis plan has been developed to determine the site class, seismic site response, liquefaction potential, soil settlement potential, and allowable bearing capacity of the soil for the IIFP Facility site. Details of the analysis plan and the codes and standards to be followed are detailed below.

The proposed scope of the IIFP Facility geotechnical investigation, including the planned tests and their use for determining soil parameters, is as follows:

- Perform pathfinder surveys for determination of essential settlement parameters with dilatometer soundings to 150 feet of depth or blade thrust refusal load of 25 tons;

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- Perform pathfinder surveys for determination of approximate small strain seismic data and large strain shear strength data with Seismic Cone Penetration Test soundings to 150 feet of depth or cone thrust refusal load of 25 tons;
- Perform critical determination of small strain seismic shear modulus and Poisson Ratio data with Cross-hole Seismic Tests to depths of 150 feet or so depending on the requirements as defined by the Engineering use of the individual buildings and geology determined by the dilatometer and seismic cone penetration test soundings;
- Perform drilling and borings in select locations, based on data from dilatometer and Seismic Cone Penetration Test soundings, including Standard Penetration Test borings, to 150 feet of depth;
- Perform soil sampling in Standard Penetration boreholes to obtain disturbed and undisturbed soil samples; and
- Perform auger borings to 15 feet of depth and obtain bulk disturbed soil samples.

The proposed drilling and boring location guidelines are as follows:

- Structures: 1 boring for every 2500 square feet,
- Pier foundations: 1 boring for every pier, and
- Roads: 1 boring for every 500 feet.

Geotechnical Standards under which activities and tests will be performed in accordance with American Society for Testing and Materials (ASTM) standards. See Section 2.3.3 "Geotechnical and Geophysical Codes and Standards" for applicable ASTM Standards.

License Documentation Impact: Revised Section 1.7.4.1 (formerly 1.6.4.1) of the IIFP License Application will be amended to refer to the geotechnical and geophysical investigation plan provided in the IIFP ISA Summary new Section 1.5.4. Wording will be added as a last paragraph to Section 1.7.4.1 to read as follows:

IIFP will conduct geotechnical and geophysical investigations and analyses to determine the site class, seismic site response, liquefaction potential, soil settlement potential, and allowable bearing capacity of the soil for the IIFP Facility site. Details of the analysis plan and the codes and standards to be followed are provided in the IIFP ISA Summary Section 1.5.4 and Section 2.3.3, respectively.

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SS-6. *Background:*
The regulations in 10 CFR 70.64(a)(4) require the applicant to include environmental conditions and dynamic effects associated with normal operations, maintenance, testing, and postulated accidents that could lead to loss of safety functions. 10 CFR 70.62(c)(iv) requires the applicant to conduct and maintain an ISA that identifies potential accident sequences caused by credible external events. In addition, 10 CFR 70.61(b) and 70.61(c) require the applicant to demonstrate that an accident event can be excluded from further consideration based on either its likelihood or its consequences.

Issue:
In ISA Summary Section 5.2.1, Hazard Identification Method, the applicant stated that "Impacts from general aviation planes or helicopters are credible but extremely unlikely. Although the damage potential to FEP/DUP facilities has not been quantified, it is reasonable to assume that the building structures that are designed and built to seismic criteria are sufficient to protect the hazardous materials within the buildings. Therefore, radiological and/or hazardous material releases are minimal (Underline added)." The technical basis supporting this assumption is needed to determine whether buildings are designed sufficiently to protect hazardous materials from aircraft crash hazards.

Request:
Provide a technical basis for the assumption that building structures that are designed and built to seismic criteria are sufficient to protect the hazardous materials within the buildings from impacts of general aviation planes or helicopters.

RESPONSE: The Aircraft Hazard Risk Determination referenced in the response to RAI SS-4 was performed. All three proximity criteria of Standard Review Plan (SRP) NUREG 0800 Section 3.5.1.6 were met. Even though not required, calculations were performed as a further check to calculate the annual probability of an aircraft crash into the target area of the IIFP Facility from CFR Part 121 and Part 135 operations using the airway closest to the site. These calculations estimate that the probability per year of an aircraft crashing into the plant from the closest Federal airway is well below the NRC threshold metric of 1×10^{-7} which means an aircraft crash into the target area is an incredible event and thus requires no further consideration in the integrated safety analysis.

License Documentation Impact: The 2nd paragraph of ISA Summary Section 5.2.1 will be deleted in response to RAI SS-2. The aircraft crash hazard determination has been conducted and an explanation is provided in the IIFP ISA Summary Section 1.2.4.3 "Nearby Air Transportation" in response to RAI SS-4.

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SS-7. *Background:*

The regulations in 10 CFR 70.64(a)(2) and 70.64(a)(4) require the applicant to include adequate protection against natural phenomena, environmental conditions, and dynamic effects in its design of the facility. In addition, 10 CFR 70.61(b) and 70.61(c) require the applicant to demonstrate that an accident event can be excluded from further consideration based on either its likelihood or its consequences.

Issue:

In LA Section 1.1.2.1, Process Buildings and Process Areas and ISA Summary Sections 2.4, Process Buildings and 5.2.1, Hazard Identification Method, the applicant did not provide any load combination information for the structural design of Process Buildings. The applicant also indicated in its ISA Summary Section 5.2.1, that due to the seismic design capacity of the process buildings, the FEP/DUP Plant is expected to withstand hazards such as high wind, snow loading, flooding, and other natural phenomena-related hazards with minimal damage. However, a technical basis is not provided to support this assumption. Furthermore, the applicant did not include civil structural design information in either LA or ISA Summary to permit assessment of reasonableness of the IIFP proposed design.

Request:

1. *Provide a facility site plan, layout of the buildings, and multiple horizontal and vertical cross-sectional drawings of the conceptual structural design of all the Process Buildings.*

2. *Provide information about the structural and foundation design of Process Buildings with emphasis on seismic design, including design bases, design criteria, design methodology, and design codes used for reinforced concrete and steel structures.*

3. *Provide a description of the methods used to conduct structural analyses of Process Buildings with an emphasis on seismic analysis, including major assumptions made such as fixed supported structures or soil-structure interaction structures, modeling methodology used, type of seismic analyses conducted, and computer codes used.*

4. *Provide a description of the methods used to conduct seismic analysis of equipment, piping, silos, and other mechanical systems.*

5. *Provide load combinations to be used for structural design of Process Buildings and demonstrate, using these load combinations, that the load combinations with seismic hazard bound all other hazards, including the hazards in RAI 2 at the site for the design of these Process Buildings.*

6. *Either determine the effects of building damage, including collapse resulting from a ground motion corresponding to an annual probability of 10^{-5} on radiological and chemical consequences on workers and the public; or demonstrate that the proposed seismic design of buildings justify excluding seismically-induced building damage from the ISA.*

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RESPONSE: (Requests #1 through 5):

1. An updated conceptual facility site plan drawing is being included with this Seismic and Structural RAI response package. Also conceptual floor plans of all process buildings showing equipment layout, and multiple horizontal and vertical cross-sectional drawings of the conceptual structural design of all the Process Buildings are being furnished as part of the engineering drawing updates being included with the Seismic and Structural RAI response package.

2. At this time, IIFP is providing information on the codes and standards to be used for the design of concrete and steel structures of Process Buildings (involving or affecting licensed materials). Information concerning the structural and foundation design of process buildings with emphasis on seismic design, including design bases, design criteria, and design methodology-used for reinforced concrete foundations and steel structures will be available after geotechnical and geophysical investigation and analysis are completed and after preliminary structural analysis is completed by the Design/Build Contractor. The design codes and standards that IIFP is committed to following in the design of buildings and structures for the facility are provided below in License Documentation Impact (Request #2).

3. Information concerning the description of the methods used to conduct structural analyses of process buildings with an emphasis on seismic analysis, including major assumptions made such as fixed supported structures or soil-structure interaction structures, modeling methodology used, type of seismic analyses conducted, and computer software used will be available after geotechnical and geophysical investigation and analysis are completed and after preliminary structural analysis is completed by the Design/Build Contractor.

4. Information concerning the description of the methods used to conduct structural analyses of process buildings with an emphasis on seismic analysis, including major assumptions made such as fixed supported structures or soil-structure interaction structures, modeling methodology used, type of seismic analyses conducted, and computer software used will be available after geotechnical and geophysical investigation and analysis are completed and after preliminary structural analysis is completed by the Design/Build Contractor.

5. The load combinations to be used for the design of concrete and steel structures of both non-process buildings and process buildings at the IIFP facility are listed below. The load combinations will be used by the Design/Build Contractor, after geotechnical and geophysical investigation and analysis are completed, and after preliminary structural analysis is completed, to determine the bounding hazard conditions (including the loads from hazards discussed in SS RAI-2) for the buildings and structures at the IIFP Facility.

NON-PROCESS BUILDINGS AND STRUCTURES - For those buildings and structures that do not contain licensed materials or that do not affect licensed materials (i.e. those buildings and structures that do not contain IROFS), the following load combinations will be used for structural design in accordance with ASCE 7-05:

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Concrete Load Combinations:

1. $1.4(D + F)$

2. $1.2(D + F + T) + 1.6(L + H) + 0.5(Lr \text{ or } S \text{ or } R)$

3. $1.2D + 1.6(Lr \text{ or } S \text{ or } R) + (L \text{ or } 0.8W)$

4. $1.2D + 1.6W + L + 0.5(Lr \text{ or } S \text{ or } R)$

5. $1.2D + 1.0E + L + 0.2S$

6. $0.9D + 1.6W + 1.6H$

7. $0.9D + 1.0E + 1.6H$

Notes:

1. *The load factor on L in combinations (3), (4), and (5) is permitted to equal 0.5 for all occupancies in which live load is less than or equal to 100 psf, with the exception of garages or areas occupied as places of public assembly.*
2. *The load factor on H shall be zero in combinations (6) and (7) if H counteracts W or E. Where lateral earth pressure provides resistance to other forces, it shall not be included in H but shall be included in the design resistance.*
3. *In combinations (2), (4), and (5), the companion load S shall be either the flat roof snow load (p_f) or the sloped roof snow load (p_s).*

Steel Load Combinations:

For steel, either the Load and Resistance Factor Design (LRFD) load combinations listed above or the Allowable Strength Design (ASD) load combinations listed below can be used:

1. $D + F$

2. $D + H + F + L + T$

3. $D + H + F + (Lr \text{ or } S \text{ or } R)$

4. $D + H + F + 0.75(L + T) + 0.75(Lr \text{ or } S \text{ or } R)$

5. $D + H + F + (W \text{ or } 0.7E)$

6. $D + H + F + 0.75(W \text{ or } 0.7E) + 0.75L + 0.75(Lr \text{ or } S \text{ or } R)$

7. $0.6D + W + H$

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8. $0.6D + 0.7E + H$

Note:

In combinations (4) and (6), the companion load S shall be either the flat roof snow load (p_f) or the sloped roof snow load (p_s).

<u>**PROCESS BUILDINGS AND STRUCTURES**</u> - For process buildings and structures that contain licensed materials or that affect licensed materials, (i.e. those buildings and structures that contain IROFS) the following load combinations for extreme load cases will be added to the load combinations above:

Concrete Load Combinations per ACI 349-06

$D + F + 0.8L + C + H + T + Ro + Es$

$D + F + 0.8L + H + T + Ro + Wt$

Notes:

1. *The second load combination shall be satisfied first without the tornado missile load. When considering tornado missile loads, local section strength and stresses may be exceeded provided there will be no loss of intended function of any safety-related systems.*
2. *The crane load C may be omitted if the simultaneous occurrence of DBE with crane usage is not credible.*
3. *Es can be reduced by 10% if the exceeding probability of Es is equal to or lower than 1.0E-4 (mean).*

Steel Load Combinations per AISC N690-06

If Load and Resistance Factor Design (LRFD) is used:

$D + 0.8L + C + T + Ro + Es$

$D + 0.8L + T + Ro + Wt$

Note:

The load C can be waived if the probability of Es and C occurring at the same time is less than 10E-6.

If Allowable Strength Design (ASD) is used:

$D + L + C + Ro + T + Es$

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D + L + Ro + T + Wt

Notes:

1. *The allowable strength can be increase by 1.5 for members or fasteners in axial tension or in shear and by 1.6 for other cases.*
2. *The load C can be waived if the probability of Es and C occurring at the same time is less than 10E-6.*

Notation:

D = dead load

E = earthquake load

F = load due to fluids with well-defined pressures and maximum heights

H = load due to lateral earth pressure, ground water pressure, or pressure of bulk materials

L = live load

Lr = roof live load

R = rain load

S = snow load

T = self-straining force, including thermal effects and loads during normal operating conditions

W = wind load

Es = Design Basis Earthquake load

Wt = tornado load

Ro = pipe reactions during normal operating conditions

C = rated capacity of crane (shall include the maximum wheel loads of the crane and the vertical, lateral, and longitudinal forces induced by the moving crane).

For those buildings that do not contain licensed materials or that do not affect licensed materials (i.e. those buildings and structures that do not contain IROFS), the following codes and standards will be used for structural and foundation design where there is emphasis on seismic design:

NMCBC 2009 New Mexico Commercial Building Code,

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IBC 2009	International Building Code,
ASCE 7-05	Minimum Design Loads for Buildings and Other Structures,
ACI 318-08	Building Code Requirements for Structural Concrete,
ACI 530-08	Building Code Requirements for Masonry Structures,
ASCE 5-08	Building Code Requirements for Masonry Structures,
TMS 402-08	Building Code Requirements for Masonry Structures,
ANSI/ AISC 360-05	Specification for Structural Steel Buildings,
AISC	Steel Construction Manual 13th Edition,
ANSI/ AISC 341-05	Seismic Provisions for Structural Steel Buildings,
AWS D1.1-2004	Structural Welding Code - Steel, American Welding Society.

For process buildings and structures that contain licensed materials or that affect licensed materials, (i.e. those buildings and structures that contain IROFS) the following codes and standards will be used for structural and foundation design where there is emphasis on seismic design:

NMCBC 2009	New Mexico Commercial Building Code,
IBC 2009	International Building Code,
ASCE 7-05	Minimum Design Loads for Buildings and Other Structures,
ANSI/AISC N690-06	Specification for Safety-Related Steel Structures for Nuclear Facilities,
ANSI/AISC 360-05	Specification for Structural Steel Buildings,
AISC	Steel Construction Manual 13th Edition,
AWS D1.1-2004	Structural Welding Code - Steel, American Welding Society,
ACI-349-06	Code Requirements for Nuclear Safety Related Concrete Structures,
ASCE 4-98	Seismic Analysis of Safety-Related Nuclear Structures

License Documentation Impact: (Request # 1): Add the following drawings to the "Fluorine Extraction Process & Depleted Uranium De-conversion Plant (FEP/DUP) License Application Engineering Drawings" package that was furnished with the IIFP License Application:

- Replace conceptual facility site plan drawing 100-C-0001 Rev D with updated drawing 100-C-0001 Rev E.
- Add conceptual floor plans of process buildings showing equipment layout, and add multiple horizontal and vertical cross-sectional drawings of the conceptual structural design of the Process Buildings (drawings: 400-M-1201-D, 400-M-1202-B, 500-1201-C and 500-1202-C).

License Documentation Impact (Requests #2): The codes and standards will be added to IIFP ISA Summary Section 2.3.2 in response to RAI SS-8 for structural and foundation design of IIFP Facility buildings with emphasis on seismic design.

License Documentation Impact (Requests #3 through 5): None at this time.

RESPONSE (Request # 6): Based upon guidance provided in NUREG-1520, an assessment of building damage and the resulting radiological and chemical consequences from a seismic event

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that has a 1 x 10^{-5} annual probability is not required. The consequences of a 1 x 10^{-5} annual probability (100,000 year return period) seismic event does not need to be evaluation as the frequency is such that risk acceptability is met based on likelihood alone.

Table 5-8 of the ISA Summary (provided below) shows the scoring of initiating events based on frequency. A 100,000 year return period results in a 10^{-5} annual probability and is scored a -5. Using this value we can then determine the likelihood category for this event. (Note: prevention/protection IROFS are typically included in the likelihood determination, but none are assumed present for this scenario). Table 5-9 of the ISA Summary is provided below. Based on the -5 scoring from Table 5-8, the 100,000 year return seismic event is categorized as a highly unlikely event. Also the comments column of Table 5-8 was originally added to illustrate examples for the failure frequency indices, but is now being deleted to avoid apparent confusion between the "comment" and "frequency evidence" statements.

Table 5-8. Initiating Event Failure Frequency Index Values

Failure Frequency Index*	Based on Evidence	~~Comments~~
-6	External Event with frequency of <10^{-6}/yr	~~If initiating event, no IROFS needed.~~
-5	External Event with frequency of >10^{-6}/yr and <10^{-5}/yr	~~If initiating event, no IROFS needed.~~
-4	No occurrences in 30 years for hundreds of similar systems in industry	~~Rarely can be justified by evidence.~~
-3	No occurrences in 30 years for tens of similar systems in industry	~~Requires multiple failures or failure of a robust passive system to result in adverse consequences.~~
-2	No occurrences of this type in this facility in 30 years	~~Applicable for passive system failures.~~
-1	A few occurrences during facility lifetime	~~Applicable for routine mechanical failures.~~
0	Occurs every 1 to 3 years	~~Applicable for operator errors, loss of power, or other routine system failures.~~
1	Several occurrences per year	
2	Occurs every week or more often	

*Based on the example provided in NUREG-1520. Indices less than (more negative than) -1 should not be assigned unless the configuration management, auditing, and other management measures are high quality.

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Table 5-9. Likelihood Categories

Event Likelihood	Likelihood Category	Probability of Occurrence	Qualitative Description
Not Unlikely	3	Greater than 10^{-4} per event per year	
Unlikely	2	Between 10^{-4} and 10^{-5} per event per year	Consequence Category 2 accidents must be "unlikely."
Highly Unlikely	1	10^{-5} or less per event per year	Consequence Category 3 accidents must be "highly unlikely."

The consequences and likelihood categories are displayed below in Table 5-10 (from the ISA Summary) in a 3 x 3 risk index matrix. The overall risk number of an accident is determined by the product of the likelihood category number and the consequence category number.

Unacceptable risk levels are highlighted with shaded areas. IROFS are needed for accidents that fall in the shaded regions so that an acceptable risk level is achieved.

Table 5-10. Risk Matrix and Risk Index Values

Severity of Consequences	Likelihood of Occurrence		
	Likelihood Category 1 Highly Unlikely (1)	Likelihood Category 2 Unlikely (2)	Likelihood Category 3 Not Unlikely (3)
Category 3 High Consequence (3)	Acceptable Risk 3	Unacceptable Risk 6	Unacceptable Risk 9
Category 2 Intermediate Consequence (2)	Acceptable Risk 2	Acceptable Risk 4	Unacceptable Risk 6
Category 1 Low Consequence (3)	Acceptable Risk 1	Acceptable Risk 2	Acceptable Risk 3

A 100,000 year return period seismic event results in a risk number of 3 and meets criteria for acceptable risk. But as shown in Table 5-10 from the ISA Summary, events that fall into Likelihood Category 1 meet risk acceptability regardless of the consequences. Even assuming facility collapse and high radiological and chemical consequences occur during a 100,000 year earthquake, we still meet the criteria for acceptable risk.

License Documentation Impact (6): None for this RAI response.

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SS-8. *Background:*
The regulations in 10 CFR 70.64(a)(2) and 70.64(a)(4) require the applicant to include adequate protection against natural phenomena, environmental conditions, and dynamic effects in its design of the facility.

Issue:
In LA Section 2.2.7, DB contractor, the applicant stated that it will rely on the DB contractor to ensure that design meets all applicable Federal, State, and local codes and standards required for the startup stage of the project. However, the applicant did not provide this list.

Request:
Provide a list of applicable Federal, State, and local codes and standards that the DB contractor will use for the startup stage of the project.

RESPONSE: The following is a list of applicable Federal, State, and local codes and standards that the DB contractor will use during the detailed design, construction and startup stage of the project to insure adequate protection against natural phenomena, environmental conditions, and dynamic effects. The DB contractor will also ensure, as part of the written contract, that design meets these applicable federal, state and local codes and standards.

License Documentation Impact: Revise Section 2.3 "Building Codes and Standards" of the IIFP ISA to replace existing building codes with an updated and expanded list of building codes. After Table 2-2 following the second paragraph of 2.3, insert new Sections 2.3.1, 2.3.2, 2.3.3, 2.3.4, and 2.3.5 to read as follows:

2.3 Building Codes and Standards

The design and construction of the on-site IIFP facility buildings conform to applicable building codes and standards. The ~~basic~~ construction codes applied include:

- ~~International Building Code (IBC) as amended by the NMCBC,~~
- ~~Uniform Mechanical Code (UMC) as amended by the New Mexico Mechanical Code (NMMC),~~
- ~~Uniform Plumbing Code (UPC) as amended by the New Mexico Plumbing Code (NMPC),~~
- ~~International Energy Conservation Code (IECC) as amended by the New Mexico Energy Conservation Code (NMECC),~~
- ~~International Fire Code (IFC),~~
- ~~NFPA 101 (Life Safety Code), and~~
- ~~National Electrical Code as amended by the New Mexico Electrical Code (NMEC).~~

~~Codes followed for construction are the latest editions as adopted by the State of New Mexico.~~ Table 2-2 below is a listing of code conformance for buildings located on site based on New Mexico Commercial Building Code (NMCBC, ~~2006~~2009), NFPA 13 (NFPA, ~~2007a~~2010), and NFPA 101 (NFPA, ~~2007b~~2009).

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2.3.1 General Building Codes and Standards

2009	New Mexico Commercial Building Code (adopts by reference the 2009 International Building Code (IBC) with amendments),
2009	New Mexico Energy Conservation Code (adopts by reference the 2009 international energy conservation code (IECC) with amendments),
2009	New Mexico Plumbing Code (adopts by reference the 2009 Uniform Plumbing Code (UPC) with amendments),
2009	New Mexico Mechanical Code (adopts by reference the 2009 Uniform Mechanical Code (UMC) with amendments) ,
2008	New Mexico Electrical Code (adopts by reference the 2008 national electrical code (NEC) with amendments),
2007	New Mexico Electrical Safety Code (adopts by reference the 2007 national electrical safety code (NESC) with amendments),
2009	International Fire Code,
2010	American Society for Mechanical Engineering (ASME) Section VIII, Division 1 Design and Fabrication of Pressure Vessels,
2010	ASME B31.1 "Power Piping",
2009	ASME B31.3 "Process Piping",
2010	ASME B31.5 "Refrigeration Piping and Heat Transfer Components,"and
2008	ASME B31.9 "Building Services Piping".

2.3.2 Structural and Foundation Codes and Standards

ASCE 7-05	Minimum Design Loads for Buildings and Other Structures,
ACI 318-08	Building Code Requirements for Structural Concrete,
ACI 530-08/	Building Code Requirements for Masonry Structures,
ASCE 5-08/	Building Code Requirements for Masonry Structures,
TMS 402-08	Building Code Requirements for Masonry Structures,
ANSI/ AISC 360-05	Specification for Structural Steel Buildings,
AISC	Steel Construction Manual 13th Edition,
ANSI/ AISC 341-05	Seismic Provisions for Structural Steel Buildings,
AWS D1.1-2004	Structural Welding Code - Steel, American Welding Society,
ANSI/AISC N690-06	Specification for Safety-Related Steel Structures for Nuclear Facilities
ACI-349-06	Code Requirements for Nuclear Safety Related Concrete Structures, and
ASCE 4-98	Seismic Analysis of Safety-Related Nuclear Structures.

2.3.3 Geotechnical and Geophysical Codes and Standards

Editions listed are shown exactly as designated by ASTM organization as being active editions. If the standard identifier number does not have a date in parenthesis, the active date is designated by the last two digits in the standard identifier number.

- ASTM D420-98 (2003) Standard Guide to Site Characterization for Engineering, Design, and

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	Construction Purposes,
• ASTM D421-85 (2007)	Standard Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants,
• ASTM D422-63 (2007)	Standard Test Method for Particle Size Analysis of Soils,
• ASTM D854-10	Standard Test Method for Specific Gravity of Soils,
• ASTM D1140-00 (2006)	Standard Test Method for Amount of Material in Soils Finer than the No. 200 Sieves,
• ASTM D1452-09	Standard Practice for Soil Investigation and Sampling by Auger Borings,
• ASTM D1557-09	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3 (2,700 KN – m/m^3)),
• ASTM D1586-08a	Standard Method for Penetration Test and Split-Barrel Sampling of Soils,
• ASTM D1883-07e2	Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils,
• ASTM D2216-10	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock,
• ASTM D2487-10	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System),
• ASTM D2488-09a	Standard Practice for Description and Identification of Soils (Visual Manual Procedure),
• ASTM D2850-03a (2007)	Test Method for Unconsolidated, Un-drained Strength of Cohesive Soils in Triaxial Compression,
• ASTM D4220-95 (2007)	Standard Practices for Preserving and Transporting Soil Samples,
• ASTM D4318-10	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils,
• ASTM D4428-07	Standard Test Method for Cross-hole Seismic Testing,
• ASTM D4633-10	Standard Test Method for Energy Measurement for Dynamic Penetrometers,
• ASTM D4767-11	Standard Test Method for Consolidated-Un-drained Triaxial Compression Test on Cohesive Soils,
• ASTM D5434-09	Guide for Field Logging of Subsurface Explorations of Soil and Rock,
• ASTM D5778-07	Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils,
• ASTM D6635-01 (2007)	Standard Test Method for Performing the Flat Dilatometer (SUPPLIER shall implement method exceptions cited in Subpart 3.2.6 of this Specification because of obsolescence of major elements in ASTM D6429), and
• ASTM D6429-99 (2006)	Standard Guide for Selecting Surface Geophysical Methods.

2.3.4 NFPA Codes and Standards

NFPA 10-2010	Portable Fire Extinguishers,
NFPA 13-2010	Installation of Sprinkler Systems,
NFPA 14-2010	Standard for the Installation of Standpipe and Hose Systems,
NFPA 15-2007	Standard for Water Spray Fixed Systems for Fire Protection,
NFPA 20-2010	Installation of Stationary Pumps for Fire Protection,

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NFPA 22-2008	Water Tanks for Private Fire Protection,
NFPA 24-2010	Installation of Private Fire Service Mains and Their Appurtenances,
NFPA 30-2008	Flammable and Combustible Liquids Code,
NFPA 45-2011	Fire Protection for Laboratories Using Chemicals,
NFPA 54-2011	National Fuel Gas Code,
NFPA 55-2010	Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in portable and Stationary Containers, Cylinders and Tanks,
NFPA 70-2011	National Electric Code,
NFPA 70E-2009	Standard for Electrical Safety in the Workplace®,
NFPA 72-2010	National Fire Alarm Code,
NFPA 80-2010	Standard for Fire Doors and Other Opening Protectives,
NFPA 80A-2007	Recommended Practice for Protection of Buildings from Exterior Fire Exposures,
NFPA 85-2011	Boiler and Combustion Systems Hazards Codes,
NFPA 90A-2009	Installation of Air-conditioning and Ventilating Systems,
NFPA 90B-2009	Installation of Warm Air Heating and Air-conditioning Systems,
NFPA 91-2010	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids,
NFPA 101-2009	Life Safety Code,
NFPA 110-2010	Emergency and Standby Power Systems,
NFPA 220-2009	Standard on Types of Building Construction
NFPA 221-2009	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls,
NFPA 251-2006	Standard Methods of Tests of Fire Resistance of Building Construction and Materials,
NFPA 430-2004	Storage of Liquid and Solid Oxidizers,
NFPA 600-2010	Standard on Industrial Fire Brigades,
NFPA 780-2011	Standard for the Installation of Lightning Protection Systems,
NFPA 801-2008	Standard for Fire Protection for Facilities Handling Radioactive Materials, and
NFPA 1410-2010	Standard on Training for Initial Emergency Scene Operations.

2.3.5 Instrumentation and Controls Codes and Standards

The criteria in the following regulatory guides and standards will be used to ensure that the instrumentation and control IROFS will be designed to monitor and control their behavior:

NRC Regulatory Guide 1.53	"Criteria for Safety Systems" (Endorses IEEE Std. 279-1971),
NRC Regulatory Guide 1.118	"Periodic Testing of Protection Systems,"
NRC Regulatory Guide 1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 603-1998),
NRC Regulatory Guide 1.153	"I & C Safety Systems" (Endorses IEEE Std. 603-1991),
NRC Regulatory Guide 1.168	"Software Verification and Validation Reviews and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants " (Endorses IEEE Std. 1012-1998),
NRC Regulatory Guide 1.169	"Configuration Management Plans for Digital Computer Software

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	Used in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 828-1990),
NRC Regulatory Guide 1.170	"Software Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 829-1983),
NRC Regulatory Guide 1.171	"Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 1008-1987),
NRC Regulatory Guide 1.172	"Software Requirements Specifications for Digital Computer Software Used in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 830-1993),
NRC Regulatory Guide 1.173	"Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants" (Endorses IEEE Std. 1074-1995),
NRC Regulatory Guide 1.180	"Electromagnetic Compatibility" (Endorses IEEE Std. 1050-1996, IEC Std. 61000-2005, IEEE Std. C62.41-1991, and Mil Std. 461-1991),
NRC Regulatory Guide 1.209	"Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants,"
ANSI/ISA-67.04.01-2000	"Setpoints for Nuclear Safety-Related Instrumentation,"
IEEE Std. 336-1985	"Standard Installation, Inspection, and Testing Requirements for Power Instrumentation, and Control Equipment at Nuclear Facilities,"
IEEE Std 384-1992	"Standard Criteria for Independence of Class 1E Equipment and Circuits,"
IEEE Std 344-1987	"IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Generating Stations,"
IEEE Std 338-1987	"IEEE Standard Criteria for Periodic Testing of Nuclear Power Generating Station Class 1E Power and Protection Systems,"
IEEE Std 518-1982	"IEEE Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources,"
NUREG-0800	Standard Review Plan, Branch Technical Position HICB-11, "Guidance on the Application and Qualification of Isolation Devices,"
NUREG-0800	Standard Review Plan, Branch Technical Position HICB-17, "Guidance on Self-Test and Surveillance Test Provisions,"
NRC Regulatory Guide 1.180-2000	"Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems," and
NRC Regulatory Guide 1.100-1988, Revision 2,	"Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants."

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License Documentation Impact: The former 6th paragraph of Section 1.1.2 of the IIFP License Application, Revision A, will be revised to read as follows:

1.1.2 Facility Description

See ISA Summary Section 2.3 for a list of applicable Federal, State, and local codes and standards that the DB contractor will use during the detailed design, construction and startup stage of the project to insure adequate protection against natural phenomena, environmental conditions, and dynamic effects. The DB contractor will also ensure, as part of the written contract, that design meets these applicable federal, state and local codes and standards. Buildings, lighting, fire protection, and building support systems are designed in accordance with latest revisions, of building and construction codes including where applicable the National Fire Protection Association (NFPA) standards, local and State codes, and related codes and standards. A list of NFPA Standards is repeated in Chapter 7 of the LA, Table 7-1.

A listing of the major buildings and estimated sizes is provided in Table 1-2.

License Documentation Impact: The last paragraph of Section 1.1.2.1 of the IIFP License Application, Revision A, will be revised this RAI will supersede RAI GI-6B to read as follows:

1.1.2.1 Process Buildings and Process Areas

The process buildings are classified per NFPA 13 as Ordinary Group 2 and are protected with 100 percent coverage, wet-type fire protection sprinkler systems with Class 1 standpipes between floors in all exit stairways of multi-story buildings~~. (NFPA, 2007).~~Further information is provided for code construction conformance requirements in the IIFP Integrated Safety Analysis Summary, Section 2.3. IIFP will contract and use a Design and Build contractor for detail design, engineering and construction of the IIFP Facility.

License Documentation Impact: The last paragraph of Section 4.4.2 of the IIFP ISA Summary will to read as follows:

4.4.2 Natural Phenomena Hazards

Engineering design requirements for all active and passive IROFS will include adequate protection from natural phenomena events. Seismic, wind, and lightning hazards will be specifically addressed through implementation of building code design requirements as listed in Section 2.3. ~~such as: IBC (International Building Code, as amended by the 2006 New Mexico Commercial Building Code) (IBC, 2006), ASCE 7-05 (Minimum Design Loads for Buildings and Other Structures) (ASCE, 2006), and NFPA 780 (Standard for the Installation of Lightning Protection Systems) (NFPA, 2008a).~~Table 4-~~9~~10 and Table 4-~~10~~11 document examples of how the design incorporated natural phenomena hazards for engineered IROFS.

License Documentation Impact: Revise references in Section 2.6 to reflect the updated versions of building codes to read as follows:

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2.6 References

IIFP, 2009. International Isotopes Fluorine Products, Inc., "License Application for FEP/DUP Facility." International Isotopes Fluorine Products, 2009.

NFPA, 2007a2010. National Fire Protection Association "NFPA 13, Installation of Sprinkler Systems." Quincy, MA, MA : National Fire Protection Association, 20072010a.

NFPA, 2007b2009. National Fire Protection Association."NFPA 101, Life Safety. *Life Safety Code."* Quincy, MA, MA : National Fire Protection Association, 20072009b.

NMCBC, 20062009. New Mexico Commerical Building Code, Title 14, "Housing and Construction," Chapter 7, Building Codes General Part 2. s.l. : http://www.nmcpr.state.nm.us/nmac/parts/title14/14.007.0002.htm, 20062009.